

WE CLAIM:

1. A method for fuel driveability index detection, the method comprising:
 - obtaining a first input signal indicating a first oxygen sensor voltage;
 - obtaining a second input signal indicating a second oxygen sensor voltage at a period subsequent to said first input signal;
 - determining a first voltage trend based on said first input signal and said second input signal; and
 - determining whether said first voltage trend is decreasing at a rate greater than a first voltage threshold rate.
2. The method of claim 1, further including adjusting open loop fueling if said first voltage trend is decreasing at a rate greater than said first voltage threshold rate.
3. The method of claim 2, wherein said adjusting said open loop fueling occurs within about five seconds of a cold start of said engine.
4. The method of claim 2, wherein said adjusting said open loop fueling includes adding fuel to combustion chambers of said engine.
5. The method of claim 4, wherein said adding fuel is accomplished by increasing a base pulse width command to fuel injectors of said engine.
6. The method of claim 1, further including sensing an engine run condition prior to obtaining said first input signal.
7. The method of claim 6, wherein said sensing said engine run condition includes determining whether a software logic flag indicating an engine run condition has been set.
8. The method of claim 6, further including determining whether cold start is enabled if said engine run condition is sensed.

9. The method of claim 8, further including determining whether an engine crank time is exceeded if said cold start is enabled.

10. The method of claim 1, further including determining whether closed loop fueling is disabled prior to obtaining said second input signal.

11. The method of claim 1, further including determining whether engine coolant temperature is within a temperature operating window prior to obtaining said second input signal.

12. The method of claim 1, wherein said first input signal is saved for a period.

13. The method of claim 1, wherein a software logic flag indicating a high driveability index is set if said first voltage trend is decreasing at a rate greater than said first voltage threshold rate.

14. The method of claim 1, further including:
determining whether said first voltage trend is increasing at a rate greater than a second voltage threshold rate if said first voltage trend is not decreasing at a rate greater than said first voltage threshold rate; and
determining whether an engine run timer is less than an engine run timer threshold if said first voltage trend is not increasing at a rate greater than said second voltage threshold rate.

15. The method of claim 14, wherein a software logic flag indicating a low driveability index is set if said first voltage trend is increasing at a rate greater than said second voltage threshold rate.

16. The method of claim 14, further including:

obtaining a next input signal indicating a next oxygen sensor voltage if said engine run timer is less than said engine run timer threshold;

determining a second voltage trend based on said first input signal and said next input signal; and

determining whether said second voltage trend is decreasing at a rate greater than said first voltage threshold rate.

17. The method of claim 16, further including adjusting open loop fueling if said second voltage trend is decreasing at a rate greater than said first voltage threshold rate.

18. The method of claim 16, wherein a software logic flag indicating a high driveability index is set if said second voltage trend is decreasing at a rate greater than said first voltage threshold rate.

19. A method for operating an engine, the method comprising:
obtaining a first input signal indicating a first oxygen sensor voltage;
obtaining a second input signal indicating a second oxygen sensor
voltage during said period;
determining a first voltage trend based on said first input signal and said
second input signal;
determining whether said first voltage trend is decreasing at a rate
greater than a first voltage threshold rate;
adjusting open loop fueling if said first voltage trend is decreasing at a
rate greater than said first voltage threshold rate;
determining whether said first voltage trend is increasing at a rate greater
than a second voltage threshold rate if said first voltage trend is not decreasing at a rate
greater than said first voltage threshold rate;
obtaining a next input signal indicating a next oxygen sensor voltage if
said engine run timer is less than said engine run timer threshold;
determining a second voltage trend based on said first input signal and
said next input signal;
determining whether said second voltage trend is decreasing at a rate
greater than said first voltage threshold rate; and
adjusting open loop fueling if said second voltage trend is decreasing at
a rate greater than said first voltage threshold rate.

20. A system for fuel driveability index detection, the system comprising:

- an engine;
- an oxygen sensor disposed within the exhaust gas passage of said engine;
- an engine control module operatively connected to said engine; and
- said engine control module having a processor for obtaining a first input signal indicating a first oxygen sensor voltage, obtaining a second input signal indicating a second oxygen sensor voltage at a period subsequent to said first input signal, determining a first voltage trend based on said first input signal and said second input signal and determining whether said first voltage trend is decreasing at a rate greater than a first voltage threshold rate.

21. The system of claim 20, further including said processor adjusting open loop fueling if said first voltage trend is decreasing at a rate greater than said first voltage threshold rate.

22. The system of claim 21, wherein said adjusting said open loop fueling occurs within about five seconds of a cold start of said engine.

23. The system of claim 21, wherein said adjusting said open loop fueling includes adding fuel to combustion chambers of said engine.

24. The system of claim 23, wherein said adding fuel is accomplished by increasing a base pulse width command to fuel injectors of said engine.

25. The system of claim 20, further including said processor sensing an engine run condition prior to obtaining said first input signal.

26. The system of claim 25, wherein said sensing said engine run condition includes determining whether a software logic flag indicating an engine run condition has been set.

27. The system of claim 25, further including said processor determining whether cold start is enabled if said engine run condition is sensed.

28. The system of claim 27, further including said processor determining whether an engine crank time is exceeded if said cold start is enabled.

29. The system of claim 20, further including said processor determining whether closed loop fueling is disabled prior to obtaining said second input signal.

30. The system of claim 20, further including said processor determining whether engine coolant temperature is within a temperature operating window prior to obtaining said second input signal.

31. The system of claim 20, wherein said first input signal is saved for a period.

32. The system of claim 20, wherein a software logic flag indicating a high driveability index is set if said first voltage trend is decreasing at a rate greater than said first voltage threshold rate.

33. The system of claim 20, further including said processor:
determining whether said first voltage trend is increasing at a rate greater than a second voltage threshold rate if said first voltage trend is not decreasing at a rate greater than said first voltage threshold rate; and
determining whether an engine run timer is less than an engine run timer threshold if said first voltage trend is not increasing at a rate greater than said second voltage threshold rate.

34. The system of claim 33, wherein a software logic flag indicating a low driveability index is set if said first voltage trend is increasing at a rate greater than said second voltage threshold rate.

35. The system of claim 33, further including said processor:
obtaining a next input signal indicating a next oxygen sensor voltage if
said engine run timer is less than said engine run timer threshold;
determining a second voltage trend based on said first input signal and
said next input signal; and
determining whether said second voltage trend is decreasing at a rate
greater than said first voltage threshold rate.

36. The system of claim 35, further including said processor
adjusting open loop fueling if said second voltage trend is decreasing at a rate greater
than said first voltage threshold rate.

37. The system of claim 35, wherein a software logic flag indicating
a high driveability index is set if said second voltage trend is decreasing at a rate greater
than said first voltage threshold rate.

38. A system for operating an engine, the system comprising:

- an engine;
- an oxygen sensor disposed within the exhaust gas passage of said engine;
- an engine control module operatively connected to said engine;
- said engine control module having a processor for:
 - obtaining a first input signal indicating a first oxygen sensor voltage;
 - obtaining a second input signal indicating a second oxygen sensor voltage during said period;
 - determining a first voltage trend based on said first input signal and said second input signal;
 - determining whether said first voltage trend is decreasing at a rate greater than a first voltage threshold rate;
 - adjusting open loop fueling if said first voltage trend is decreasing at a rate greater than said first voltage threshold rate;
 - determining whether said first voltage trend is increasing at a rate greater than a second voltage threshold rate if said first voltage trend is not decreasing at a rate greater than said first voltage threshold rate;
 - obtaining a next input signal indicating a next oxygen sensor voltage if said engine run timer is less than said engine run timer threshold;
 - determining a second voltage trend based on said first input signal and said next input signal;
 - determining whether said second voltage trend is decreasing at a rate greater than said first voltage threshold rate; and
 - adjusting open loop fueling if said second voltage trend is decreasing at a rate greater than said first voltage threshold rate.

39. A vehicle comprising the system of claim 20.

40. A vehicle comprising the system of claim 38.

41. A storage medium encoded with a machine-readable computer program code for fuel driveability index detection, the storage medium including instructions for causing a processor to implement a method comprising:

obtaining a first input signal indicating a first oxygen sensor voltage;

obtaining a second input signal indicating a second oxygen sensor voltage at a period subsequent to said first input signal;

determining a first voltage trend based on said first input signal and said second input signal; and

determining whether said first voltage trend is decreasing at a rate greater than a first voltage threshold rate.

42. A storage medium encoded with a machine-readable computer program code for operating an engine, the storage medium including instructions for causing a processor to implement a method comprising:

obtaining a first input signal indicating a first oxygen sensor voltage;

obtaining a second input signal indicating a second oxygen sensor voltage during said period;

determining a first voltage trend based on said first input signal and said second input signal;

determining whether said first voltage trend is decreasing at a rate greater than a first voltage threshold rate;

adjusting open loop fueling if said first voltage trend is decreasing at a rate greater than said first voltage threshold rate;

determining whether said first voltage trend is increasing at a rate greater than a second voltage threshold rate if said first voltage trend is not decreasing at a rate greater than said first voltage threshold rate;

obtaining a next input signal indicating a next oxygen sensor voltage if said engine run timer is less than said engine run timer threshold;

determining a second voltage trend based on said first input signal and said next input signal;

determining whether said second voltage trend is decreasing at a rate greater than said first voltage threshold rate; and

adjusting open loop fueling if said second voltage trend is decreasing at a rate greater than said first voltage threshold rate.